



COMMONWEALTH of VIRGINIA

Department of Health

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E. ANNE PETERSON, M.D., M.P.H.
STATE HEALTH COMMISSIONER

October 1, 2001

Mr. Alex Barron
Office of Water Quality Programs
Department of Environmental Quality
629 East Main Street
Richmond, VA 23219

Re: Fish Tissue Data for Tidewater Community College (TCC) Lake Sites #63 and #64

Dear Mr. Barron:

This is in response to your e-mail of September 28, 2001, regarding the referenced subject.

I have reviewed the fish tissue data, which you provided for total PCBs, chlordane, and DDT in different fish species from the TCC lake sites #63 and #64. It appears from the review of these data that the concentrations of these chemicals found in fish tissue samples are very low. Therefore, no health risks to the general public are anticipated from consuming fish, at the reported concentrations, from the referenced sites.

I hope this information will be of help to you. Should you have any questions, please feel free to contact me 786-1763.

Sincerely,

A handwritten signature in dark ink, appearing to read "R. K. Tripathi".

Ram K. Tripathi, Ph.D.

Toxicologist

Division of Health Hazards Control

RKT/pfh

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY
Office of Environmental Research and Standards
629 East Main Street Richmond, VA 23240

SUBJECT: Risk Assessment and Acceptable Fish Consumption
Rates for Children Based on the Fish Tissue
Contamination Data for Fish Analyzed From the
Tidewater Community College lakes.

TO: Eric Salopek

FROM: Alex Barron

DATE: June 5, 2002

Data from the analysis of fish collected by the DEQ from the lakes at the Tidewater Community College (TCC lakes) in 2000 indicated only low levels of contamination with a variety of pollutants commonly detected fish tissue. These data have been reviewed by the Virginia Health Department who concluded that there was no reason to consider issuing a health advisory for these lakes. Comments from the Restoration Advisory Committee (RAC) concerning the data indicate that the pollutants chlordane, DDT, PCBs and mercury are the pollutants of concern to the RAC group. It is my understanding that the RAC group has requested more information on the potential risk to children from eating fish from these lakes. I will try to provide some more insight into this issue.

DEQ uses guidance developed by the U.S. Environmental Protection Agency (EPA) for assessing the potential risk to consumers of contaminated fish tissue to consumers of recreationally caught fish. These guidelines can be used to assess the risk of eating contaminated fish for children or adults by modifying the assumptions regarding body size and meal size (small children tend to eat smaller size portions). Of course, there is a wide range of body sizes and fish eating rates that are conceivable but generally they fall into realistic ranges. Usually, for a pollutant that is considered a probable carcinogen, assessing the possible risk on the basis of potential extra cancer (at a rate of 1 in 100,000) will result in less allowable fish meals than considering other potential toxic effects. Hence the cancer risk is usually the most sensitive endpoint to assess. Sometimes potential developmental or reproductive effects might be important if the concentration of the pollutant is very high and children are likely to be exposed at via high rates of consumption. These effects can also be assessed to make sure nothing is being missed.

To address these concerns, EPA has developed methods for calculating acceptable daily and monthly limits on fish consumption

for children when considering a certain concentration of a pollutant in the fish. I used these equations to calculate the allowable daily and monthly limits for children for chlordane, DDT, PCBs and mercury. To be conservative, I used the highest concentration of the pollutant found in any of the fish in either of the two lakes as the assumed concentration in the fish. I used EPA's recommendations for assumptions regarding the average child (under six years old) body weight of about 32 pounds and used an assumed meal size of four ounces (1/2 the average adult meal size). I converted metric data into pounds for easier understanding. Based on these calculations, the following information is produced:

	Allowable Daily Consumption Rate (pounds per day)	Monthly Meals (4 oz.)
Chlordane (@0.35 ppb)	5.48	667
DDT (@11ppb)	1.45	177
PCBs (@2.24ppb)	0.2854	35
Mercury (@0.032ppm)	0.0999	12

For children under six years old:
 Assumed body weight = 31.96 pounds (14.5 kg)
 Assumed meal size 4 ounces (0.1134 kg)

Based on this information, it should be acceptable for children to eat 12 four-ounce meals per month.

In the EPA document titled Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories (July 1997), EPA provides tables for a range of acceptable number of meals for children for a variety of pollutants, including chlordane, DDT and PCBs and mercury at varying meal sizes. I am supplying copies of these tables with this memo. These tables can be used to assess other possible rates of consumption if desired. Just be sure that the units are compatible. The EPA tables list the concentrations of the pollutants as parts per million (PPM) but DEQ data for chlordane, DDT and PCBs are presented as parts per billion (PPB). To convert PPB to PPM, move the decimal point 3 places to the left; i.e. 1 PPB becomes 0.001 PPM.

However, after EPA published this document in 1997, EPA reassessed the toxicity of chlordane and has determined that chlordane is approximately 3.7 times less potent a carcinogen than previously thought. This means that the potential for risk for cancer posed by being exposed to chlordane contaminated fish is about 3.7 times lower than indicated in the Table 4-17 (monthly consumption limits for carcinogenic health endpoints).

I hope this helps provides the information you need.

Tidewater Community College/Former Nansemond Ordnance Depot

Suffolk, Virginia

Fish Tissue and Sediment Results

August 2000 Sampling Event

DEQ Fish Sampling Results

- Samples collected by DEQ personnel
- Analysis conducted on fish fillets
- William and Mary College conducted metals analysis
- Virginia Institute of Marine Science (VIMS) conducted organic halogens and non-halogens analysis
- Analysis indicated presence of Mercury (Hg) in fish fillets
 - Hg levels were below DEQ Screening Value of 0.3 ppm
- Virginia Health Department screening level for further study is 0.5 ppm
- DEQ Screening Value (0.3 ppm) may change in time, based upon available data
- Ingestion of fish fillets at Hg levels of 6.5 grams/day or above, over an adults lifetime may pose a health threat
 - 6.5 grams/day = 1 - 2 average fish fillet meals per month
- Hg results of 0.015 ppm - 0.032 ppm were consistent with regional background levels
- EPA and the University of Virginia is currently gathering data on the Hg contaminant transport theory
 - University of Virginia will soon be conducting a 2 - 3 year study of atmospheric contaminant transport mechanisms

DEQ Fish Sampling Results

August 2000 Event

Fish Samples Collected August 22nd - 23rd, 2000

LOCATION/SAMPLE #	FISH SPECIES	# of Fish	Length (cm)	Wt. (gr)	As 0.07	Cd 10	Cr 32	Hg 0.3	Pb NA	Se 50
TCC LAKE/OTF147	LRGMOUTH BASS	10	26.6-34	120-598	BDL	BDL	BDL	0.027	BDL	BDL
TCC LAKE ND/OTF146	BLUEGILL	7	13-20	44-192	BDL	BDL	BDL	0.032	BDL	BDL
TCC LAKE/OTF148	PUMPKINSEED	10	14.8-16.2	72-94	BDL	BDL	BDL	0.015	BDL	BDL
J - LAKE ND/OTF149	BLACK CRAPPIE	8	13-14	28-36	BDL	BDL	BDL	0.032	BDL	BDL

Results in Parts Per Million (ppm) 0.3 = DEQ Screening Value (ppm)

As = Arsenic
Hg = Mercury
ND = Near Dam

Cd = Cadmium
Pb = Lead
U = Upper

Cr = Chromium
Se = Selenium

DEQ Fish Tissue Sampling Results

- Samples collected by DEQ personnel
- Virginia Institute of Marine Science (VIMS) conducted organic halogens and non-halogens analysis
- Total PCBs, Total Chlordane and Total DDT results were all well below DEQ Screening Values
- Fish Tissue Results for PCBs, DDE and Total Chlordane of Largemouth Bass and White Crappie were well below average concentrations in National Study (US EPA, 1991)
- Fish Tissue Results for PCBs, DDE and Total Chlordane of Bluegill and Pumpkinseed were not available in National Study
- National Average Concentrations of DDE and Total Chlordane in Largemouth Bass were 53.72 ppb & 2.89 ppb, respectively
- National Average Concentrations of DDE and Total Chlordane in White Crappie were 10.04 ppb & 0.34 ppb, respectively
- National Average Concentration of Total PCBs in Largemouth Bass was 232.26 ppb
- National Average Concentration of Total PCBs in White Crappie was 22.34 ppb
- Sum PAH PECs were all below Screening Value

DEQ Fish Sampling Results

August 2000 Event

Fish Samples Collected August 22nd – 23rd, 2000

LOCATION	FISH SPECIES	# of Fish	Length (cm)	Wt. (gr)	Total PCB	Total Chlordane	Total DDT
TCC LAKE ND	LARGEMOUTH BASS	10	26.6-34	120-598	2.24	0.28	11.0
TCC LAKE ND	BLUEGILL	7	13-20	44-192	1.19	0.19	4.84
TCC LAKE ND	PUMPKINSEED	10	14.8-16.2	72-94	1.26	0.35	5.16
J - LAKE ND	BLACK CRAPPIE	8	13-14	28-36	1.44	-	1.30
DEQ Screening Values (ppb)					50	300	300

ND = Near Dam

All Results in Parts Per Billion

PCB = Polychlorinated Biphenyls

DDT = Dichlorodiphenyltrichloroethane

DEQ Fish Sampling Results

August 2000 Event

Fish Samples Collected August 22nd – 23rd, 2000

LOCATION	FISH SPECIES	# of Fish	Length (cm)	Wt. (gr)	Sum PAH PEC*	Total Polycyclic Aromatic Hydrocarbons
TCC LAKE ND	LARGEMOUTH BASS	10	26.6-34	120-598	0.00	9.39
TCC LAKE ND	BLUEGILL	7	13-20	44-192	0.00	10.4
TCC LAKE ND	PUMPKINSEED	10	14.8-16.2	72-94	0.00	7.46
J - LAKE ND	BLACK CRAPPIE	8	13-14	28-36	0.00	13.2
DEQ Screening Values (ppb)					10	NA

ND = Near Dam All Results in ppb = Parts Per Billion

* PEC = Potency Equivalency Concentration is Sum of Seven PAHs bases on Relative Potency Estimates.

NA = Insufficient Toxicological Information for this Chemical to Calculate a Screening Value

DEQ Sediment Sampling Results

- Samples collected by DEQ personnel
- Analysis conducted on discrete sediment samples
- William and Mary College conducted metals analysis
- Virginia Institute of Marine Science (VIMS) conducted organic halogens and non-halogens analysis
- Sediment samples were collected from TCC Lake near Dam, TCC Upper Lake and J Lake near Dam
- All sediment sample results were below the NOAA Effects Range - Median Threshold
- All sediment sample results represent absolute values
- One or more exceedences of a NOAA Effects Range - Median value results in a fully supporting but threatened status for aquatic life use support.
- A risk-based screening analysis of the August 2000 data has not been conducted against human health and/or ecological effects

DEQ Sediment Sampling Results

August 2000 Event

Sediment Samples Collected August 22nd - 23rd, 2000

LOCATION/SAMPLE #	Al	Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Sb	Se	Tl	Zn
	-	3.7	70	9.6	370	270	0.71	51.6	223	-	-	-	410
TCC LAKE	-	-	-	-	-	-	-	-	-	-	-	-	-
TCC LAKE ND/63A-2XXX	0.82	0.65	4.4	0.95	23	46	0.53	19	64	BDL	BLD	BDL	295
TCC U LAKE/63B-2XXX	0.37	0.15	1.6	BDL	14	12	0.021	BDL	8.5	BDL	BDL	BDL	12
J - LAKE	-	-	-	-	-	-	-	-	-	-	-	-	-
J - LAKE ND/64-2XXX	0.73	0.93	BDL	0.7	21	54	0.29	6.6	63	BDL	BDL	BDL	145

Results in Parts Per Million (ppm) 370 = NOAA Effects Range - Median Threshold

Al = Aluminum
Ag = Silver
As = Arsenic
Cd = Cadmium
Cr = Chromium

Cu = Copper
Hg = Mercury
Ni = Nickel
Pb = Lead
ND = Near Dam

Sb = Antimony
Se = Selenium
Tl = Thallium
Zn = Zinc
U = Upper